SPiRiT Documentation Materials and Resources

4.R1 Storage and Collection of Recyclables - Required

- **Intent:** Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.
- **Requirement:** Provide an easily accessible area that serves the entire building that is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, glass, plastics, and metals.

4.R1 Storage and Collection of Recyclables - Required

- **Submittals:** Provide drawings highlighting locations for collection and storage of materials separated for recycling. Indicate the path from recycling locations to the building loading dock and demonstrate that the recycling area can handle the expected material volumes.
- **Project Documents:**
  - Specifications: 11170 Solid Waste Handling Equipment.
  - Drawings: Highlight the area for collection of recyclables on the floor plans. Also highlight locations of waste collection chutes and receptacle areas.
  - Design Analysis: Provide a narrative substantiating that the space allotted for collection of recyclables is adequate for the facility.

Table 1: Solid Waste Generation Rates

Building Type	Amount of Solid Waste
Warehouses	1.5 lbs / 100 SF /day
Office Buildings	1 lb / 100 SF / day
Department Stores	3 lbs / 100 SF / day
Supermarkets	7 lbs / 100 SF / day
Restaurants	2 lbs / 100 SF / day
Drugstores	3 lbs / 100 SF / day
Cafeterias	0.5 to 0.75 lbs / meal
Clubs	1.5 lbs / meal
Hotels	2 lbs / room / day & 2 lbs / meal
Schools	6 lbs / room & 0.25 lbs / student / day
Hospitals	20 lbs / bed / day & 2 lbs / meal
Nursing Homes	4 lbs / person / day

Source: International Dynetics Corporation

Area guidelines based on law passed by City of Portland. These are guidelines only.

Table 3: Recycling Area Guidelines

Commercial Building Square Footage [SF]	Minimum Recycling Area [SF]
0 to 5,000	82
5,001 to 15,000	125
15,001 to 50,000	175
50,001 - 100,000	225
100,001 - 200,000	275
200,001 or more	500

4.C1 Building Reuse – *1-3 Points*

- **Intent:** Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.
- **Requirement:** Reuse large portions of existing structures during renovation or redevelopment projects.
  - Maintain at least 75% of existing building structure and shell (exterior skin and framing excluding window assemblies). (1 point)
  - Maintain an additional 25% (100% total) of existing building structure and shell (exterior skin and framing excluding window assemblies). (1 point)
  - Maintain 100% of existing building structure and shell AND 50% non-shell (walls, floor coverings, and ceiling systems). (1 point)

4.C1 Building Reuse – *1-3 Points*

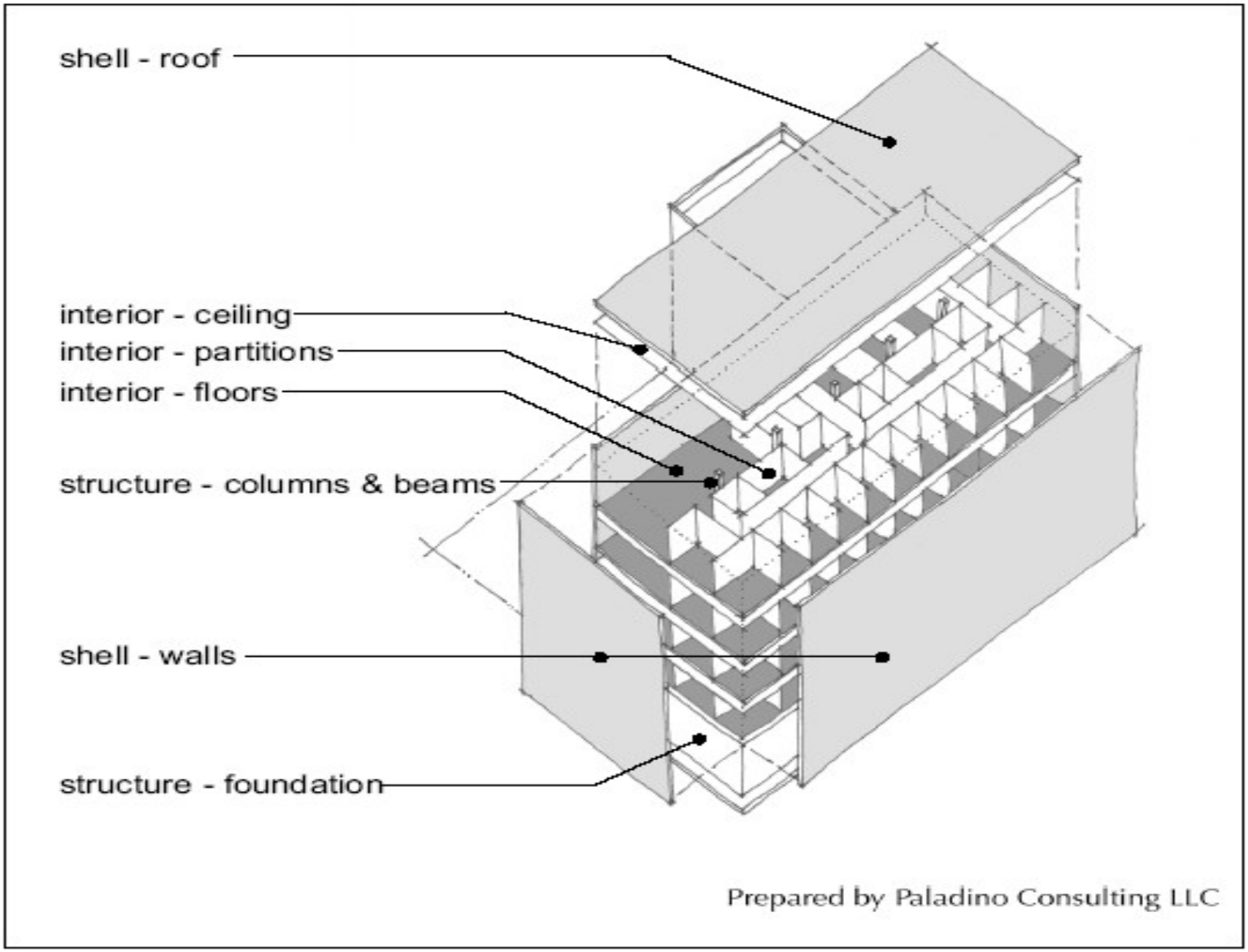

Figure 1: Example Reuse of Building

4.C1 Building Reuse – *1-3 Points*

Equation 1:

$$\text{Structural Reuse } [\%] = \frac{\text{Reused Elements [CF]}}{\text{Total Elements [CF]}}$$

Equation 2:

$$\text{Shell Reuse } [\%] = \frac{\text{Reused Elements [SF]}}{\text{Total Elements [SF]}}$$

Equation 3:

$$\text{Building Reuse } [\%] = \frac{(\text{Structural Reuse } [\%] + \text{Shell Reuse } [\%])}{2}$$

Equation 4:

$$\text{Non–Shell Reuse } [\%] = \frac{\text{Reused Elements [SF]}}{\text{Total Elements [SF]}}$$

4.C1 Building Reuse – *1-3 Points*

- In order to qualify for this point, the existing building must undergo a substantial renovation. If the project includes an addition that is greater than 50% of the existing building's square footage, it is considered a new building and is thus ineligible for the building reuse credit. In such cases, the reused building materials should be included as part of Credit 4.C2 Construction Waste Management.
- Do not include doors and similar elements. You can apply the environmental benefits of reusing these elements to Credit 4.C2 Construction Waste Management. If an item that cannot be reused for its original function is reprocessed (on or off the site) and installed for a different use, it can be counted toward Credit 4.C3 Resource Reuse. Wood beams that are re-milled for a similar use, for instance, would be applicable to this credit. Demolished concrete that is crushed on site for use as structural fill would also be applicable to Credit 4.C3.

4.C1 Building Reuse – *1-3 Points*

- **Submittals:** As appropriate provide:
  - Pre- and post-construction plan and elevation drawings highlighting reused structure and shell elements. Include calculations demonstrating percent of the shell and structure reused.
  - Pre- and post-construction drawing highlighting reused interior walls, floor coverings, and ceilings. Include calculations demonstrating that 50% of the non-shell components were reused.
- **Project Documents:**
  - ***Specifications:*** 02225 Selective Demolition.
  - ***Drawings:*** Note and highlight on the architectural demolition drawings the structural elements which are to be preserved. On the Elevations, note and highlight the shell elements to be preserved.
  - ***Design Analysis:*** Provide calculations substantiating the percent of the existing building structure and shell are being preserved **AND** calculations showing 50% of the non-shell components we reused, as appropriate to Credits sought.

4.C2 Construction Waste Management - *1-2 Points*

- **Intent:** Divert construction, demolition, and land clearing debris from landfill disposal. Redirect recyclable material back to the manufacturing process.
- **Requirement:** Develop and implement a waste management plan, quantifying material diversion by weight.
  - Recycle and/or salvage at least 50% (by weight) of construction, demolition,and land clearing waste. (1 point)
  - Recycle and/or salvage an additional 25% (75% total by weight) of the construction, demolition, and land clearing debris. (1 point)

4.C2 Construction Waste Management - *1-2 Points*

- **Submittal:**
  - Provide a copy of the project Waste Management Plan highlighting recycling and salvage requirements.
  - Provide calculations on end-of-product recycling rates, salvage rates, and landfill rates demonstrating that the percent of construction waste recycled or salvaged (50% for 1 point, 75% for two points).
- **Project Documents:**
  - ***Specifications:*** 01505 Construction Waste Management.
  - ***Drawings:*** Indicate on appropriate architectural, plumbing, mechanical, and electrical demolition drawings which materials are expected to be diverted.
  - ***Design Analysis:*** Include a Waste Management Plan and projected recycling and salvage rates.

4.C2 Construction Waste Management - *1-2 Points*

- **Calculations:** Use a spreadsheet to track the weights of construction wastes that are land filled and the weight of construction, demolition and land clearing (CDL) wastes that are recycled. To calculate the recycling percentage, use **Equation 1**. Calculations can be done by weight or volume, but must be consistent throughout. Do not include hazardous waste and excavation soil in the calculations.

Equation 1:

$$\text{Recycling Rate } [\%] = \frac{\text{Recycled Waste}}{\text{Recycled Waste} + \text{Garbage}}$$

4.C2 Construction Waste Management - *1-2 Points*

Recycled and Salvaged Materials	Weight [tons]
Concrete	138.0
Land Clearing Debris	56.2
Wood	19.6
Gypsum Wallboard	9.5
Masonry	9.4
Cardboard	7.2
Steel	3.1
Furniture	2.5
TOTAL	**245.5**

Garbage	Weight [tons]
Miscellaneous Garbage	43.7
TOTAL	**43.7**

Table 5: Solid Waste Conversion Factors

Material	Density [lbs/CY]
Cardboard	100
Gypsum Wallboard	500
Mixed Waste	350
Rubble	1,400
Steel	1,000
Wood	300

% = 100 X 245.5 / (245.5 + 43.7)

% = 85%

4.C3 Resource Reuse *1-2 Points*

- **Intent:** Extend the life cycle of targeted building materials, reducing environmental impacts related to materials manufacturing and transport.
- **Requirement:**
  - Specify salvaged or refurbished materials for 5% of building materials. (1 point)
  - Specify salvaged or refurbished materials for 10% of building materials. (1 point)

4.C3 Resource Reuse *1-2 Points*

- Submittals:
  - Provide specifications and contractor submittals highlighting salvaged and refurbished materials used in the project.
  - Provide calculations demonstrating the appropriate percentage of building materials were salvaged. Include the origin and cost for salvaged materials and the total cost for building materials.
- Project Documents:
  - ***Specifications:*** XX050 for each material division.
  - ***Drawings:*** Indicate with notes on appropriate architectural drawing where refurbished materials are to be used.
  - ***Design Analysis:*** Provide a table listing all sections of the specifications where salvaged or refurbished material have been specified including the respective estimated dollar values of these materials. Demonstrate that this accounts for 5% or 10% of the building materials used.

4.C3 Resource Reuse *1-2 Points*

- **Calculations:** Use a spreadsheet to list all the materials and products used in the project and their costs. This spreadsheet can also be used for Credits 3, 4, 6 and 7. Identify those materials that are salvaged and determine their cost percentage. Determine percentages in terms of dollar value using the following steps:
  - 1. Calculate total dollars* of the salvaged or refurbished material.
  - 2. Calculate total dollars* of all building materials.
  - 3. Divide Step 1 by Step 2 to determine the percentage.

  Exclusions: In total dollar calculations, exclude; labor costs; all mechanical and electrical material and labor costs; and project overhead and fees.

*If the cost of the salvaged or refurbished material is below market value, use replacement cost to estimate the material value, otherwise use actual cost to the project.

4.C3 Resource Reuse *1-2 Points*

Provide total construction cost for 45% default total materials value; OR Provide total materials cost (exclude labor, equipment)		$ 2,879,744
Product Name	**Company Name**	**Product Cost**
Brick (salvaged)	Salvage Company	$ 33,700
Reclaimed Wood	Salvage Company	$ 130,000
	Sub-total salvaged or reused	**$ 163,700**
	Salvaged and reused materials as a percentage of total materials cost	**5.68%**

4.C4 Recycled Content – *1-2 Points*

- **Intent:** Increase demand for building products that have incorporated recycled content material, reducing the impacts resulting from extraction of new material.
- **Requirement:**
  - Specify a minimum of 25% of building materials that contain in aggregate a minimum weighted average of 20% post-consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material. (1 point)
  - Specify an additional 25% (50% total) of building materials that contain in aggregate, a minimum weighted average of 20% post consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material. (1 point)

4.C4 Recycled Content – *1-2 Points*

- **Submittals:**
  - Provide specification and contractor submittals highlighting recycled content materials installed.
  - Provide a spreadsheet of all materials used on the project highlighting recycled content materials. Include percentage of post-consumer and post-industrial recycled content for all recycled content materials, the costs of all materials for the project, and calculations demonstrating the percentage of building materials that have the required content.
- **Project Documents:**
  - ***Specifications:*** XX050 for each material division.
  - ***Drawings:*** NA
  - ***Design Analysis:*** Provide a table listing all sections of the specifications where recycled materials or materials with recycled content are available. List the percentage of recycled content per material, the estimated quantity, the cost, and the total estimated project cost. Provide calculations showing that the requirement(s) has been satisfied.

4.C4 Recycled Content – *1-2 Points*

- **Calculations:** Use a spreadsheet to list all the materials and products used in the project and their costs. For those materials that have recycled content, identify the percentage of post-consumer and/or post-industrial content by weight, and list the recycled content information source. Most products will have only one type of recycled content, but some may have both. Use **Equation 1** to determine each product's recycled content values (post-consumer and post-industrial) and calculate the total recycled content percentages using **Equation 2**. To determine point achievement, the uses the best one of two competing scenarios: post-consumer content value only, or post-consumer plus half of the post-industrial value. For assemblies, use **Equation 3** to determine the recycled content.

4.C4 Recycled Content – *1-2 Points*

Equation 1:

$$\text{Recycled Content Value [\$]} = \text{Material or Product Cost [\$]} \times \text{Recycled Content \%}$$

Equation 2:

$$\text{Recycled Content Rate [\%]} = \frac{\text{Recycled Content Value [\$]}}{\text{Total Materials Cost [\$]}}$$

Equation 3:

$$\text{Assembly Recycled Content} = \frac{\text{Material Weight [lbs]} \times \text{Recycled Content [\%]}}{\text{Total Weight [lbs]}}$$

Provide total construction cost for 45% default total materials cost; OR Provide total materials cost (exclude labor, equipment)		$ 2,879,744			
Product name	**Company**	**Product Cost**	**% Post-Consumer**	**% Post-Industrial**	**Recycled content information source**
Concrete	Concrete Company	$ 22,500	100.00%	0.00%	contractor submittal
Compost	Compost Company	$ 25,000	100.00%	0.00%	common knowledge
Rebar	Rebar Manufacturing Co.	$ 86,000	65.00%	0.00%	letter from factory
Brick (new)	Masonry Manufacturing Co.	$ 28,500	0.00%	15.00%	letter from factory
Misc. Metals	various	$ 179,000	60.00%	0.00%	manufacturer's inform.
Wheatboard Panels	Wheatboard Co.	$ 93,090	0.00%	25.00%	cut sheet
Metal Siding	Siding Co.	$ 38,000	25.00%	0.00%	product brochure
Metal Roofing	Roofing Co.	$ 35,000	85.00%	0.00%	product brochure
Ceramic Tile	Tile Co.	$ 11,396	95.00%	0.00%	product brochure
Acoustical Tile	Ceiling System Co.	$ 11,000	90.00%	0.00%	cut sheet
Carpet	Carpet Co.	$ 50,000	40.00%	0.00%	product brochure
Carpet Pad	Carpet Co.	$ 3,000	0.00%	100.00%	cut sheet
Toilet Partitions	Partition Co.	$ 4,000	100.00%	0.00%	product brochure
	Product Cost Subtotal	$ 586,486			

Total value of post-consumer content	**$ 294,776**
Total value of post-consumer content as a percentage of a total value of all materials	**10.24%**
Total value of post-industrial content	**$ 30,548**
Total value of post-industrial content as a percentage of total value of all materials	**1.06%**
Combined value of post-consumer and half of post-industrial content	**$ 310,050**
Combined value of post-consumer content plus half of post-industrial content as a percentage of total value of all materials	**10.77%**

4.C5 Local/Regional Materials - *1-2 Points*

- **Intent:** Increase demand for building products that are manufactured locally, reducing the environmental impacts resulting from transportation, and supporting the local economy.
- **Requirement:**
  - Specify a minimum of 20% of building materials that are manufactured regionally within a radius of 500 miles. (1 point)
  - Of these regionally manufactured materials, specify a minimum of 50% that are extracted, harvested, or recovered within 500 miles. (1 point)

4.C5 Local/Regional Materials - *1-2 Points*

- **Submittals:**
  - Provide specifications and contractor submittals highlighting local materials installed.
  - Provide a spreadsheet of all materials used on the project highlighting locally manufactured materials. Include the location of the material manufacturer, the distance to the project site, the costs of all materials for the project, and calculations demonstrating that 20% of building materials are manufactured within 500 miles.
  - Provide manufacturer information on locally manufactured materials demonstrating that 50% of these materials were extracted, harvested, or recovered within 500 mile of the project site.

4.C5 Local/Regional Materials - *1-2 Points*

- **Project Documents:**
  - ***Specifications:*** XX050 for each material division.
  - ***Drawings:*** NA
  - ***Design Analysis:*** Provide a table listing all sections of the specifications for which material is available within a 500 mile radius. List the estimated quantity, unit cost, and the total estimated project cost. Demonstrate that 20% of the building materials (by cost) were manufactured within a 500 mile radius. Demonstrate that 50% of the building materials above were harvested, extracted, or recovered within a 500 mile radius

4.C5 Local/Regional Materials - *1-2 Points*

- **Calculations:** Create a spreadsheet listing all materials used on the project and their associated costs. Identify those products that were manufactured within 500 miles of the project site. Sum all regionally manufactured product costs and divide this value by the total materials cost to obtain the regionally manufactured product p

Equation 1:

$$\text{Regionally Manufactured Products Rate}\ [\%] = \frac{\text{Regionally Manufactured Products Cost}\ [\$]}{\text{Total Materials Cost}\ [\$]}$$

Equation 2:

$$\text{Regionally Extracted Materials Rate}\ [\%] = \frac{\text{Regionally Extracted Materials Cost}\ [\$]}{\text{Regionally Manufactured Products Cost}\ [\$]}$$

4.C5 Local/Regional Materials - *1-2 Points*

- Next, identify those regionally manufactured products that contain materials extracted, harvested or recovered within 500 miles of the project site. Sum all regionally extracted materials costs and divide this value by the regionally manufactured products cost to obtain the regionally extracted materials percentage (see **Equation 2**).

Provide total construction cost	$	6,582,471
for 45% default total materials cost; OR	$	2,962,112
Provide total materials cost (exclude labor, equipment)		

Product name	Company	Product Cost	Distance between project & manufacturer (in miles)	Distance between project & extraction site (in miles)	Regional content information source
Reclaimed Concrete	Concrete Company	$ 22,500	9	31	Letter from manufacturer
Planting	Nursery Company	$ 35,066	42	42	Cut sheet
Compost	Compost Co.	$ 25,000	20	40	Cut sheet
Rebar	Supply Co.	$ 86,000	317	644	Letter from manufacturer
Brick (salvaged)	Salvage Co.	$ 33,700	39	58	Cut sheet
Brick (new)	Masonry Co.	$ 28,500	216	229	Letter from manufacturer
Misc. Metals	various	$ 58,700	439	?	Letters from manufacturers
Reclaimed Wood	Salvage Co.	$ 130,000	54	172	Cut sheet and letter
Millwork	Millwork Co.	$ 85,590	31	?	Cut sheets
Struct. Insulated Panels	SIP Co.	$ 80,500	500	497	Letter from manufacturer
Wallboard (gypsum)	Wallboard Co.	$ 60,000	294	566	Product literature
Wallboard (paper facing)	Wallboard Co.	$ 540	294	269	Letter from manufacturer
Toilet Partitions	Partition Co.	$ 4,000	311	427	Letter from manufacturer
	Product Cost Subtotal	$ 650,096		$ 359,806	

Total value of regionally manufactured products	**$**	**650,096**
Value of regionally manufactured products as a percentage of the value of all materials		**21.95%**
Total value of regionally extracted products	**$**	**359,806**
Value of regionally extracted materials as a percentage of regionally manufactured products		**55.35%**

4.C6 Rapidly Renewable Materials – *1 Point*

- **Intent:** Reduce the use and depletion of finite raw and long cycle renewable materials by replacing them with rapidly renewable materials.
- **Requirement:** Specify rapidly renewable building materials for 5% of total building materials.

4.C6 Rapidly Renewable Materials – *1 Point*

- **Submittals:**
  - Provide written documentation from the manufacturer, declaring the rapidly renewable material content.
  - Provide specifications and contractor submittals highlighting rapidly renewable materials installed.
  - Provide a spreadsheet of all materials used on the project highlighting rapidly renewable materials. Include manufacturer information, material costs, and calculations showing at least 5% requirement met.
- **Project Documents:**
  - ***Specifications:*** XX050 for each division, and 09600 Flooring.
  - ***Drawings:*** Note on appropriate architectural finish drawings where rapidly renewable materials are required.
  - ***Design Analysis:*** Provide a table listing sections of the specifications that call for rapidly renewable materials. Show calculations that demonstrate that rapidly renewable materials account for 5% of total building material costs.

4.C6 Rapidly Renewable Materials

- **Calculations:** Sum all rapidly renewable material costs and divide this value by the total materials cost to obtain the rapidly renewable material percentage (see **Equation 1**). **For assemblies,** calculate the percentage of rapidly renewable materials by weight (

Equation 1:

$$\text{Rapidly Renewable Material Portion [\%]} = \frac{\text{Rapidly Renewable Material Cost [\$]}}{\text{Total Materials Cost [\$]}}$$

Total construction cost	$	6,399,431
for 45% default total materials cost; OR	$	2,879,744
Provide total materials cost (exclude labor, equipment)		

Product name	Company		Product Cost	% Renewable	Rapidly renewable content information source
Miscellaneous finish carpentry	Milling Company	$	21,380	100%	Letter
Wheatboard panels	Wheatboard Company	$	93,090	100%	Product literature
Linoleum	Linoleum Company	$	18,500	100%	Cut sheet
Bamboo flooring	Flooring Company	$	70,345	100%	Cut sheet
	Product Cost Subtotal	$	203,315		

Total value of rapidly renewable products	$	203,315
Rapidly renewable building materials as a percentage of total materials cost		7.06%

4.C7 Certified Wood – *1 Point*

- **Intent:** Encourage environmentally responsible forest management.
- **Requirement:** Use a minimum of 50% of wood-based materials certified in accordance with the Forest Stewardship Council guidelines for wood building components including but not limited to framing, flooring, finishes, furnishings, and non-rented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

4.C7 Certified Wood – *1 Point*

- **Submittals:**
  - Provide wood certification documentation from the manufacturer declaring conformance with FSC Guidelines.
  - Provide specifications and contractor submittals highlighting certified wood-based materials installed.
  - Provide a spreadsheet of all wood-based project materials highlighting those certified. Include calculations demonstrating 50% of the wood-based materials are certified wood.
- **Project Documents:**
  - ***Specifications:*** 06100 Rough Carpentry, 06200 Finish Carpentry, and 06400 Architectural Woodwork.
  - ***Drawings:*** Note on applicable architectural and structural drawings where certified wood is to be used.
  - ***Design Analysis:*** Provide a list of all wood-based products used. Highlight the areas where certified wood-based materials were used and demonstrate that certified wood accounts for 50% of all wood used for the project. Supply copies of wood certification documentation from the manufacturer.

4.C7 Certified Wood – *1 Point*

Calculations:

- Identify all wood-based materials and product costs on the project, not including installation expenses (e.g., labor and equipment). Exclude salvaged and refurbished materials as well as the value of the post-consumer recycled wood fiber portion of any product. These exclusions ensure that those seeking the certified wood credit are not penalized for using non-virgin wood.
- For assemblies, calculate cost percentage of the FSC-certified wood versus the total material cost for the product, then multiply that percentage by the total product price to get the cost value of the certified wood portion (to evenly distribute labor and other production costs). If the product itself has been FSC-certified, then the entire cost of the product is to be used.
- Next, identify percentages (by weight, as detailed in Credit 4.C4) of those wood-based products that are FSC certified. All FSC-certified wood material costs are summed and then divided by the total value of wood-based products to obtain the certified wood products percentage (see **Equation 1**).

4.C7 Certified Wood – *1 Point*

Equation 1:

$$\text{Certified Wood Material Portion [\%]} = \frac{\text{FSC Certified Wood Products Cost [\$]}}{\text{Total New Wood Based Products Cost [\$]}}$$

Provide total construction cost	**$**	**19,881,455**
for 45% default total materials cost; OR	**$**	**8,946,655**
Provide total materials cost (exclude labor, equipment)		
Total cost of all wood-based products	**$**	**709,026**
Cost of Wood-based products as percentage of all materials		**7.93%**

Wood product	Vendor	Product Cost	Certified Wood %	Forest Stewardship Council chain-of-custody certificate number
Rough carpentry	Supply Company	$ 85,629	46%	SW-COC-013
Millwork, casework	Supply Company	$ 160,423	77%	SCS-COC-00067
Miscellaneous	various	$ 31,557	0%	n/a
Roof Structure	Supply Company	$ 175,309	89%	SCS-COC-00094
Doors, frames	Supply Company	$ 141,100	70%	SW-COC-675
Finish carpentry – elevator interior	Supply Company	$ 5,469	55%	SCS-COC-00067
Furniture	Office Furniture Company	$ 73,775	71%	SCS-COC-00122
Workstations	Office Furniture Company	$ 35,764	61%	SCS-COC-00122
	Product Cost Subtotal	$ 709,026		

Total value of FSC-certified wood products	**$ 494,914**
Value of FSC-certified wood products as a percentage of the value of all wood-based building materials	**69.80%**